

**SM3H—4.1 answers**

1. yes

2. no

3. yes

4. no

5. Domain:  $\left[-\frac{3}{4}, \infty\right)$ 6. Domain:  $(-\infty, 5]$ 7. Domain:  $(-\infty, \infty)$ 8. Domain:  $(-\infty, -1) \cup (-1, 3) \cup (3, \infty)$ 9. Domain:  $(-\infty, -5) \cup (-5, \infty)$ 10. Domain:  $[-2, -1) \cup (-1, 6) \cup (6, \infty)$ 11. Domain:  $[5, \infty)$ 12. Domain:  $(-\infty, \infty)$ 13. Domain:  $(-\infty, -7) \cup (-7, 0) \cup (0, \infty)$ 14. Domain:  $(-\infty, \infty)$ 15. Domain:  $(-\infty, \infty)$ Range:  $[-4, \infty)$ Increasing:  $(2, \infty)$ Decreasing:  $(-\infty, 2)$ 

Constant: none

Positive:  $(-\infty, -6) \cup (10, \infty)$ Negative:  $(-6, 10)$  $\lim_{x \rightarrow \infty} f(x) = \infty \quad \lim_{x \rightarrow -\infty} f(x) = \infty$ 16. Domain:  $(-\infty, \infty)$ Range:  $(-\infty, 4) \cup [6] \cup (8, \infty)$ 

Increasing: none

Decreasing:  $(-\infty, -2) \cup (4, \infty)$ Constant:  $[-2, 4)$ Positive:  $(-\infty, 6)$ Negative:  $(6, \infty)$  $\lim_{x \rightarrow \infty} f(x) = \infty \quad \lim_{x \rightarrow -\infty} f(x) = -\infty$ 17. Domain:  $(-\infty, \infty)$ Range:  $(-\infty, \infty)$ Increasing:  $(-\infty, 0) \cup (2, \infty)$ Decreasing:  $(0, 2)$ 

Constant: none

Positive:  $(-1, 2) \cup (2, \infty)$ Negative:  $(-\infty, -1)$  $\lim_{x \rightarrow \infty} f(x) = -\infty \quad \lim_{x \rightarrow -\infty} f(x) = \infty$ 18. Domain:  $(-\infty, \infty)$ Range:  $(-\infty, 2]$ Increasing:  $(-\infty, -2)$ Decreasing:  $(-2, \infty)$ 

Constant: none

Positive:  $(-4, 0)$ Negative:  $(-\infty, -4) \cup (0, \infty)$  $\lim_{x \rightarrow \infty} f(x) = -\infty \quad \lim_{x \rightarrow -\infty} f(x) = -\infty$ 19. Domain:  $(-7, \infty)$ Range:  $[-4, 4]$ 

Increasing: none

Decreasing:  $(-2, 2)$ Constant:  $(-7, -2) \cup (2, \infty)$ Positive:  $(-7, 0)$ Negative:  $(0, \infty)$  $\lim_{x \rightarrow \infty} f(x) = \text{none} \quad \lim_{x \rightarrow -\infty} f(x) = -4$ 20. Domain:  $(-\infty, -1) \cup (-1, \infty)$ Range:  $(-\infty, \infty)$ Increasing:  $(-\infty, -1) \cup (1, \infty)$ Decreasing:  $(-1, 1)$ 

Constant: none

Positive:  $(3, \infty)$ Negative:  $(-\infty, -1) \cup (-1, 3)$  $\lim_{x \rightarrow \infty} f(x) = -\infty \quad \lim_{x \rightarrow -\infty} f(x) = \infty$ 21.  $(1.5, 2.75)$ 22.  $(3, 2)$ 23. HA:  $y = 1$ ; VA:  $x = 2$ Domain:  $(-\infty, 2) \cup (2, \infty)$ Range:  $(-\infty, 1) \cup (1, \infty)$ 24. HA:  $y = 1$ ; VA:  $x = 1, x = -1$ Domain:  $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$ Range:  $(-\infty, -3] \cup (1, \infty)$ 25.  $x = 4$ 26.  $x = 1$ 27.  $(0, 3)$ : Between 0 and 3 feet28. Domain  $[0, 3.22]$ : Between zero and 3.22 seconds.29.  $(0, 9)$ : Between 0 and 9 cm30.  $(0, 12)$ : Between 0 and 12 feet31. Domain  $[0, 1.58]$ : Between zero and 1.58 seconds.32.  $(0, 9]$ : Between 0 and 9 hours33.  $-1(x - 4)(x + 2)$ 34.  $3(5x + 11y^3)(5x - 11y^3)$ 35.  $(4x - 1)(3x + 7)$